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- Onset of changes in phospholipid fatty acid composition and prostaglandin synthesis following dietary manipulation with n-6 and n-3 fatty acids in the rat.
- A synthetic diet preparation supplemented with 10% by weight of either safflower oil, hydrogenated coconut oil containing 3% safflower oil, or 'max EPA' fish oil was fed to rats over a 8-week period. Serial measurements of serum fatty acids, serum thromboxane B2 and urinary prostaglandin excretion were taken during the treatment period to assess the rate of change in fatty acid composition and prostaglandin synthesis following dietary manipulation. There was no significant change in weight gain between the dietary groups during the treatment period. Significant changes in serum fatty acids occurred within 48 h of treatment, with the 'max EPA' oil group having arachidonic acid levels reduced by 23% (P less than 0.01) compared to the coconut oil group. Conversely, rats fed safflower oil had an 18% enhancement of arachidonic acid during the same time period. Whole blood synthesis of thromboxane B2 was significantly depressed (P less than 0.01) after 48 h in rats fed 'max EPA' oil compared to the safflower oil or coconut oil groups. This suppression reached a maximum of 65% (P less than 0.001) after 7 days of dietary 'max EPA' oil treatment. The safflower oil and coconut oil-fed groups showed the same levels of serum thromboxane B2 production over the treatment period. Urinary excretion of both 6-ketoprostaglandin F1 alpha and prostaglandin E2 varied significantly (P less than 0.01) between the groups after 7 days of dietary treatment. Rats fed 'max EPA' oil had depressed urinary prostanoid excretion compared to the safflower and coconut oil groups which remained very similar to each other. After the 8-week treatment period rats were killed and the phospholipid fatty acid composition and prostaglandin-generating capacity of platelets, aorta and renal tissue was examined. Prostanoid production by kidney cortex and medulla and segments of aorta was consistently suppressed in rats fed 'max EPA' oil. These observations correlated well with changes in the phospholipid fatty acid profiles in these tissues. This study shows rapid changes in serum fatty acids and thromboxane B2 generation following dietary manipulation, while changes in urinary excretion or prostanoid metabolites occur only after a longer time period.
- Animals; Blood Platelets: metabolism; Dietary Fats: metabolism(#); Fatty Acids: blood, metabolism(#); Kidney: metabolism; Male; Oils: metabolism; Phospholipids: blood; Prostaglandins: biosynthesis(#), urine; Rats; Rats, Inbred Strains; Research Support, Non-U.S. Gov't; Structure-Activity Relationship; Thromboxane B2: blood; Time Factors
- Dietary Fats; Fatty Acids; Oils; Phospholipids; Prostaglandins; Thromboxane B2
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